RETI Phase 1B Final Report Update
NET SHORT RECALCULATION AND NEW PV ASSUMPTIONS
February 24, 2009

Summary

Section 3.8 of the RETI Phase 1B Final Report issued on January 2, 2009 (the Report) discussed estimation of the amount of renewable energy from new remote projects likely to be required in order to meet state goals.[1] This amount of energy was dubbed the "renewable net short." Since the Report was released, inconsistencies between the data used to estimate the renewable net short in the Report and stated RETI goals have been identified.

In addition, the treatment of projected new distributed photovoltaic (PV) installations in the Report is unclear and perhaps misleading.

At the direction of the RETI Stakeholder Steering Committee, this update document has been prepared to describe these inconsistencies and to revise the estimate of the renewable net short for purposes of RETI conceptual planning in Phase 2.[2]

California's Renewable Portfolio Standard (RPS) requires that a percentage of electric energy sold at retail by California's load serving entities (LSEs) be derived from qualified renewable energy resources. The percentage required by current law is 20% by 2010, but as described in the Report, in the RETI Mission Statement,[3] and in the Governor's Executive Order,[4] RETI's goal is to identify transmission facilities likely to be required to meet a 33% RPS requirement by the year 2020.

For purposes of estimating the renewable net short, however, the Report used the California Energy Commission (CEC) forecast of *total consumption* of electric energy in California rather than projected *retail sales* by LSEs.[5] Total consumption includes electric energy sold at wholesale for water pumping which is not subject to the RPS requirement. In addition, total consumption includes energy generated by consumers for their own consumption (self-generation)—most significantly, oil refinery cogeneration—which is also not subject to RPS requirements.

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[1] RETI Phase 1B Report – Economic Assessment of Competitive Renewable Energy Zones, Black & Veatch, January, 2009. See Section 3.8, pp. 3-35 – 3-41.

[2] Minutes of the RETI Stakeholder Steering Committee meeting of January 27, 2009, posted at: . www.energy.ca.gov/reti.

[3] Available at: www.energy.ca.gov/reti.

[4] Executive Order S-14-08, issued November 17, 2008.

[5] California Energy Commission, "California Energy Demand 2008-2018: Staff Revised Forecast, FINAL Staff Forecast, 2nd Edition", Publication # CEC-200-2007-015-SF2, November 2007. The forecast through 2018 for total consumption are in Form 1.1b-Statewide. The forecast for retail sales are in Form 1.1c - Statewide. The forecasts include energy efficiency and demand side measures that the CEC expects to occur.

The first revision discussed in this document changes the renewable net short estimate to be consistent with the 33% RPS target by using the smaller LSE retail sales projection rather than the larger total consumption estimate.

In order to forecast future LSE sales, an estimate of future self-generation is required. The CEC forecast assumed that 1,082 GWh will be self-generated by consumers from new PV installations in the year 2018, corresponding to approximately 620 megawatts of installed PV capacity.[6,7] However, California has established the Go Solar California program with a goal of installing 3,000 MW of distributed PV capacity by the year 2016.[8] In response to the California Solar Initiative, a component of the Go Solar California program, 158 MW were installed in 2008 alone.[9] The reasonableness of the CEC assumption on future PV installations and the reliance by RETI on the CEC forecast based on this assumption has been questioned by many who commented on the Report.

RETI agrees that the energy projected by the CEC to be generated by future distributed PV installations is likely too small. While acknowledging the uncertainty associated with such forecasts, for purposes of conceptual transmission planning, RETI assumes that the Go Solar Program will meet its goals by 2016 and that PV installations will continue to grow at the same rate at least through the year 2020.

The second revision described in this document increases the assumed increase in new PV installations over CEC projections and revises downward the CEC forecast of LSE sales to reflect the assumed increase in PV self-generation.

In addition, the Report assumed that 1,500 MW of PV installations would somehow count toward LSE RPS obligations. This document assumes that energy from all new PV installations will be used directly by consumers. The energy reduces LSE sales but is assumed not to count toward RPS compliance.

These adjustments reduce the RETI renewable net short from about 67,500 GWh in 2020 as described in the Report to approximately 59,700 GWh, as described below and shown in Table 1.

It must be emphasized that all forecasts are uncertain and that transmission planning must accommodate this uncertainty. In addition, California's renewable energy goals may change in the future.

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[6] California Energy Commission, "California Energy Demand 2008-2018," op. cit. See Form 1.2 – Statewide.

[7] A 20% PV capacity factor has been assumed here.

[8] See: http://www.cpuc.ca.gov/PUC/energy/Solar/. The Go Solar California statewide budget is $3.3 billion over 10 years, distributed between three distinct program components: The California Solar Initiative ($2.167 million/1940 MW); the New Solar Homes Partnership ($400 million/360 MW); and the Publicly Owned Utility Programs ($700 million/700 MW).

[9] California Solar Initiative, California Public Utilities Commission Staff Progress Report, January, 2009. http://www.cpuc.ca.gov/NR/rdonlyres/05448F68-F10D-492F-BD1E-6AF96854C15D/0/Jan09.pdf

Moreover, RETI's identification of transmission facilities likely to be required to meet state RPS goals does not constitute an official determination of need. If some of the transmission facilities identified by RETI are subsequently determined not to be needed by the appropriate regulatory body, they will not be constructed.

However, prudent planning requires RETI to consider the possibility that considerably *more* transmission may be required than indicated by the current estimate of the renewable net short. Given the lead times of seven-ten years required to develop new transmission facilities and the uncertainties of generation development, planned transmission must be able to accommodate larger or smaller amounts of generation than now forecast. Planned transmission must also support competition among renewable energy generators, in order to ensure that consumers are provided the least expensive electricity possible. RETI therefore will identify substantially more new transmission capacity than would be required by the renewable net short estimated in this document.[10]

Total Electric Energy Consumption vs. Retail Sales

As described in the Report, the RETI renewable net short was computed using the following formula:

RETI Net Short (GWh) =

{(California Energy Demand) x (Annual % RPS Requirement)}

- {(Operating Resources) + (Under Construction and Pre-Construction Resources)

+ (CSI Contribution) + (Other Renewables Contribution)} [11]

RETI's renewable planning goal, however, is based on a 33% RPS requirement, rather than 33% of total energy demand. In the formula above, therefore, the term *(California Energy Demand)* should be replaced by *(California LSE Sales).* Total demand includes energy not counted as LSE sales subject to the RPS, namely, wholesale sales and self-generation.

To be consistent with RETI goals, the smaller LSE sales projection should have been used in the Report rather than the larger total energy demand. The differences are shown in Table 1.

Table 1. CEC Forecast of Total Consumption and Retail Sales (GWh)*

	2010	2012	2014	2016	2018	2020†
Total Consumption	297,477	305,337	312,529	319,446	325,970	334,169

[10] The RETI Stakeholder Steering Committee has directed the statewide conceptual transmission plan have sufficient transfer capacity to accommodate at least 1.6 times the Renewable Net Short. This is about 96,000 GWh in 2020.

[11] Report, page 3-40.

Wholesale Sales	12,295	12,298	12,298	12,299	12,299	12,299
Non-PV Self-Gen	11,520	11,723	11,926	12,129	12,333	12,262
New PV Self-Gen	361	541	721	901	1,082	1,262
Retail Sales (RPS)	273,302	280,776	287,583	294,117	300,257	308,070
*Numbers may not add exactly due to independent rounding. †CEC estimate, private communication. The Report used a 2020 total consumption value of 335,644 GWh.						

As noted in Table 1, the Report estimated total electric energy consumption in 2020 to be 335,644 GWh.[12] LSE sales in 2020 are projected by the CEC to be 308,070 GWh. The difference between the two is 27,574 GWh. The use of LSE sales instead of total demand in the above formula would reduce the RETI renewable net short by 0.33 × 27,574 = 9,099 GWh.

The Go Solar California PV Incentive Program

In addition to using LSE sales instead of total consumption, this document also reexamines the contribution of the Go Solar California[13] program toward meeting RPS goals.

In 2007 California launched the Go Solar California (GSC) program to provide incentives for smaller distributed PV installations. The best-known component of this program is the California Solar Initiative (CSI) managed by the investor-owned utilities and overseen by the California Public Utilities Commission (CPUC.) The full Go Solar California program has a target of 3,000 MW installed by 2016.

In general, PV installations in the GSC program are consumer-owned and generate electric energy used directly by the consumer. The self-generated energy produced displaces electricity that would otherwise be sold to the customer and counted in LSE sales subject to the RPS requirement.[14] The energy from such PV installations *indirectly* reduces the LSE's RPS requirement by reducing LSE sales. However, under current CPUC rules, this energy does not count *directly* toward fulfilling that requirement, unless an Investor Owned Utility owns and operates the PV generating equipment and resells the electricity produced.

The discussion of the GSC program in the Report leaves the treatment of PV and its contribution toward reducing the renewable net short unclear.[15] On the one hand, the Report bases its renewable net short calculations on CEC total consumption forecasts which include a PV component which is only a fraction of the GSC target as shown below. On the other hand, the Report assumes that

[12] The CEC now estimates total consumption in 2020 to be 334,169 GWh.

[13] The Report referred to California's solar incentive program as the California Solar Initiative (CSI.) The CSI program is one component of the larger Go Solar California program.

[14] Self-generation includes non-PV generation as well as PV. Totals forecast by the CEC are shown in Table 1.

[15] See Report section 3.8.5.

50% of the 3,000 MW GSC 2016 target will count *directly* toward the RPS requirement. The Report also assumed that no further RPS contributions will be made by PV after 2016.

The revised formula for computing the renewable net short is:

RETI Net Short (GWh) =

{(California LSE Sales) x (Annual % RPS Requirement)}

- {(Operating Resources) + (Under Construction and Pre-Construction Resources)

+ (Go Solar California Contribution) + (Other Renewables Contribution)}

This document uses the same values as the Report for resources currently in operation, under construction or pre-construction, and for "Other Renewables" expected to be in service in 2020.[16]

For purposes of estimating the amount of remote renewable resources and associated transmission facilities expected to be needed in California, RETI revises the estimates of PV that will be installed in California by 2020 and its role in the RPS with the following assumptions:

1. The Go Solar California program will meet its target of 3,000 MW of PV by the year 2016;
2. PV installations will continue to increase, to 4,200 MW by the year 2020;
3. These installations will have an average capacity factor of 20%;[17]
4. Electric energy produced by these PV installations will reduce the energy delivered by LSEs to consumers and thereby the amount of renewable energy required to be delivered by LSEs but does not count *directly* toward LSE RPS renewable energy requirements.

With the first three of these assumptions, the Go Solar California program would reduce retail electricity sales in 2020 by:

4200 MW × 0.20 × 8760 hours = 7,358 GWh.

This is roughly six times more than the value of 1,262 GWh estimated by the CEC.

The fourth assumption implies that the Go Solar California Contribution term in the formula above is zero, since all the PV generation is assumed to be used directly by consumers and none is sold by LSEs.

The amount of PV self-generation that will occur in 2020 obviously is uncertain. In this revision, RETI assumes that the Go Solar California program will meet its target of 3,000 MW by 2016 and that installations will continue to increase to 4,200 MW by 2020. If the cost of PV installations declines significantly or new incentive programs are adopted, the amount of PV installed by 2020 could increase substantially. On the other hand, the Go Solar California program may not achieve its target as the level of incentives declines over time.

[16] Report, Tables 3-21, 3-22, and 3-24.

[17] The Report assumed a value of 25%. Generation output data from PV systems recently installed across the state show average capacity factors in the 20% range.

As shown in

Figure **E- 1**, the renewable net short, for which new transmission facilities would be required, declines as distributed self-generation from PV increases. For purposes of conceptual planning, RETI assumes that approximately 4,200 MW will be installed by 2020, based on the momentum of currently available Go Solar California incentive programs continuing past 2016.

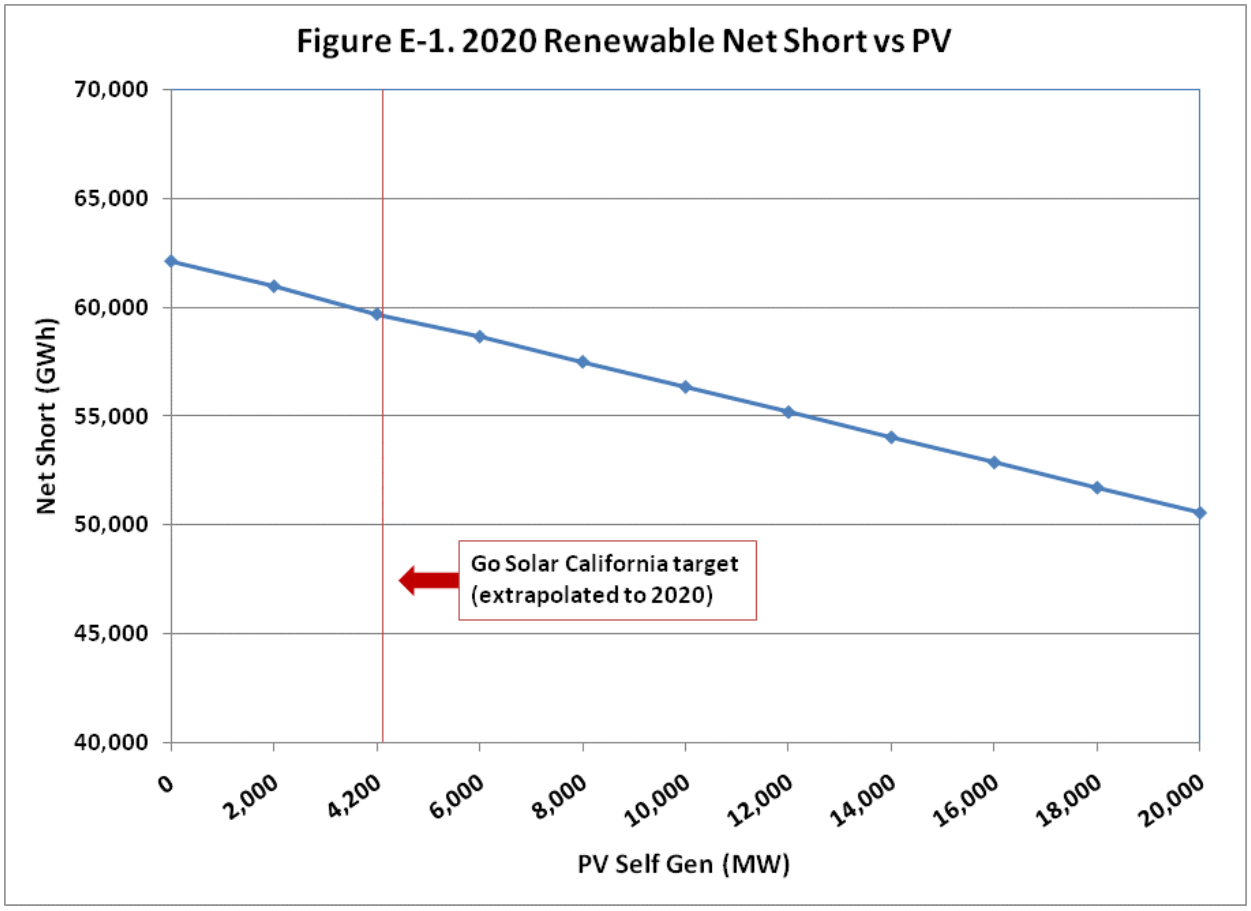

Figure E- 1 Renewable Net Short as Function of Self-Generation PV Installed by 2020.

Table 2 below shows the revised RETI net short in the year 2020, based on the revised projection of total consumption, the use of LSE sales in place of total consumption, and the assumptions noted on page 5 above. The total is approximately 59,700 GWh.

Table 2. Electricity Supplies in 2020 (GWh)							
Total Consum.	**Wholes. (non-RPS)**	**Self-Gen (non-PV)**	**Self-Gen (PV)**	**LSE Sales**	**Existing Renew.**	**Misc. Other Renew.**	**Renew. Net Short**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
334,169	12,299	12,538	7,358	**301,974**	36,807	3,134	**59,710**

Notes –
Column 1 – Revised total California electric energy end use consumption.
Column 2 – Wholesale pumping loads not subject to RPS.
Column 3 – Self-generation other than PV and not subject to RPS.
Column 4 – PV self-generation not subject to RPS – 4,200 MW @ 20% capacity factor.
Column 5 = Col.#1 – (Col.#2 + Col.#3 + Col.#4)
Column 6 – energy from renewable projects planned and under construction as of 2008.
Column 8 = 33% × (Col.#5 – Col.# 6 – Col.#7)

Conclusion

This update document revises the renewable net short calculation found in the January, 2009 RETI Phase 1B Final Report. The major difference is the use of LSE sales subject to RPS requirements in place of total consumption. In addition, this document assumes that PV installations will achieve the Go Solar California target by 2016 and reach 4,200 MW by 2020, instead of the approximately 670 MW assumed by the CEC in its forecast of LSE sales. Further, this document assumes that all electric energy generated by PV will occur as self-generation and therefore not be eligible to count toward LSE RPS requirements.

It must be emphasized that all the forecasts, projections, and assumptions underlying the net short calculation are uncertain. RETI stakeholders believe that the calculated net short represents a reasonable basis for conceptual transmission planning based on currently available information. RETI conceptual transmission plans will prudently allow for future adjustments in the net short by identifying substantially more transmission capacity that is likely to be required to meet the current estimate of the net short.